

COMMUNICATION SYSTEM WITH A CONNECTABLE RESOURCE CHANNEL

BACKGROUND OF THE INVENTION

[0001] The present invention relates to communication systems, particularly devices and methods for operating such systems.

[0002] Conventional communication systems provide connectivity between communication devices such as telephones. Resources of the systems have a finite bandwidth. Accordingly, when more users are on the system, more resources are being utilized, and less bandwidth results, and performance degrades.

[0003] Resource utilization and bandwidth have been particularly a focus of concern in recent history with the tremendous increase of users of cellular phones and Internet connectivity. Accordingly, system designers are concerned with developing systems that enhance the use of resources and bandwidth. In addition to system performance, designers are also concerned with enhancing the functionality of system to provide users with greater system versatility.

BRIEF SUMMARY OF THE INVENTION

[0004] According to one aspect of the invention, a communication system for interconnecting a plurality of communication devices includes a resource center and a softswitch. The resource center may include a computer such as an application server and a database of connection data. The softswitch may host a gateway that is remotely placed with respect to the resource center. The softswitch may be configured to connect a resource channel between one of the communication devices and the resource center and to connect an active channel between the same device and another one of the communication device.

[0005] In a number of embodiments, the softswitch may then disconnect the resource channel and reconnect the resource channel selectively upon actuation by a user. For example, a caller may actuation a resource-channel command on one of the communication. Upon receiving the command, the softswitch may cause the gateway to reconnect the resource channel. In some of the embodiments, the softswitch may store resource-channel data which may include data that enables the resource channel to be connected back to a desired level of the resource center.

[0006] In addition, when the resource channel is connected, the resource center is configured to enable a user to initiate applications with voice commands. For example, a user may initiate an application which connects the user with another one of the communication devices. Alternatively, other applications may include functionality of pushing, sending, or playing content to any number of contacts.

[0007] Accordingly, the system of the invention enable a user to utilize resources that are located at a remote location without tying up overall system resources or bandwidth because the resource channel is disconnected when not needed. When a particular application is then desired, the resource channel can then be reconnected to enable the application to be initiated.

[0008] Other features and advantages of the present invention will become apparent to those skilled in the art from a consideration of the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0009] FIG. 1 is a block diagram illustrating a communication system according to a number of embodiments;

[0010] FIGS. 2A, 2B, and 2C illustrate the connectivity of an active channel and a resource channel between two communication devices according to some of the embodiments;

[0011] FIG. 3 illustrates a resource channel bridged into an active channel between communication devices;

[0012] FIG. 4 illustrates a resource channel connected to a communication device with an active channel disconnected;

[0013] FIG. 5 illustrates methodology for connecting a resource channel;

[0014] FIG. 6 illustrates functionality of an application server according to a number of embodiments;

[0015] FIG. 7 is a flow diagram illustrating an example of a CALL application;

[0016] FIG. 8 is a flow diagram illustrating an example of a SEND application;

- [0017] FIG. 9 is a flow diagram illustrating an example of a FAX application;
- [0018] FIG. 10 is a flow diagram illustrating an example of an INVITE application;
- [0019] FIG. 11 is a block diagram of a telephony system according to other embodiments.

DETAILED DESCRIPTION OF THE INVENTION

[0020] Referring to FIG. 1 of the drawings, a telephony system **100** interconnects a plurality of communication devices **102** such as telephones or computers. For the purposes of this description, one of the communication devices **102** is referred to as an origination device **102a** that is utilized by a caller, and other communication devices **102** are referred to as destination devices **102b** that are utilized by users.

[0021] In a number of embodiments, the system **100** may include a resource center **104** and a softswitch **106**. The resource center **104** may include one or more computers **108** and one or more databases **110** for storing connection data. In some of the embodiments, the softswitch **106** may host a gateway **112**. As illustrated in FIG. 1, the gateway **112** may be located remotely with respect to (i.e., physically separated from) the resource center **104**. For example, the gateway **112** may be located in New York, while the resource center **104** may be located in Los Angeles. Accordingly, for the purposes of this description, the gateway **112** is indicated as REMOTE, and the resource center **104** is indicated as LOCAL in the drawings.

[0022] In some of the embodiments, the softswitch **106** may be a software application that is configured for hosting a gateway and facilitating connectivity between communication devices. More specifically, with additional reference to FIGS. 2A, 2B, and 2C, upon actuation by the caller via the origination device **102a**, the softswitch **106** may connect the origination device **102a** to the resource center **104** on a resource channel **114** as shown in FIG. 2A. Upon actuation again by the caller, the softswitch **106** may then initiate a connection between the origination device **102a** with a destination device **102b** on an active channel **116** as shown in FIG. 2B. If the destination device **102b** responds and the active connection **116** is established, then the softswitch **106** may drop or disconnect the resource channel **114** from the origination device **102a** as shown in FIG. 2C, thereby freeing up bandwidth in the system. Alternatively, the

softswitch 106 may disconnect from the resource channel 114 upon initiating the active channel 116.

[0023] The caller may then cause the softswitch 106 to reconnect the resource channel 114 upon providing a resource-activation command on the origination device 102b. For example, the softswitch 106 may bridge the resource channel 114 into the active channel 116 as shown in FIG. 3. Alternatively, the softswitch 106 may drop or disconnect the active channel 116 between the devices 102 and reconnect the resource channel 114 with the origination device 102a as shown in FIG. 4. Accordingly, the resource channel 114 may connect the resource center 104 to and disconnect the resource center from the origination device 102a in response to a resource-activation command.

[0024] To describe the softswitch 106 and resource channel 114 in more detail, reference is made to FIG. 5. In a number of embodiments, a caller or connected user 118 may initiate 120 a connection request. If a resource channel 114 has not yet been connected, the connection request may be a telephone number associated with the resource center 104. In embodiments where the resource channel 114 has already been connected, the connection request may be made by dialing a resource-activation command on a standard keypad of a telephone, e.g., any combination of 1, 2, ..., 9, 0, #, and *, such as ##, **, or 55. Upon receiving the resource-activation command, the gateway 112 may request 122 the resource channel 114. The softswitch 106 in turn may access or retrieve 124 resource-channel data from memory 126. The softswitch 106 may then utilize the resource-channel data to resolve 128 a path to an application and request 130 an application from the resource center 104. The resource center 104, which may include an application server 132, may then run 134 the requested application.

[0025] For the purposes of this description, the resource-channel data may include data indicative of the resource channel 114 that has been previously connected. The data may be stored in session information and may include a softswitch ID, trunk and channel ID, customer account bill-to number, number or IP address to connect to, event ID, automatic number identification (ANI), flag for new or returning call, and last used application or grammar path statement.

[0026] If the caller desires the resource channel 114 to be bridged into the active channel 116 as shown in FIG. 3, then a predetermined resource-activation command specific to such a

function may be actuated by a caller, such as ##. If the caller desired the resource channel 114 to be connected and the active channel 116 to be disconnected, then a predetermined resource-activation command specific to this function may be actuated by the caller, such as **. If it is desired drop the last call added to a conference call, then a predetermined resource-activation command specific to this drop function may be actuated by the caller, such as #0.

[0027] Reference is made to FIG. 6 with regard to a number of embodiments of the application server 132 of the resource center 104. The application server 132 may include one or more servers and databases, such as a speech server 136, a web server, and a database 140. The speech server 136 may be configured to interact with the caller by outputting 142 user response requests and receiving voice commands or user responses input 144 from the caller.

Accordingly, in a number of embodiments the speech server 136 may include an application 146 with output logic 148 and response logic 150. Accordingly, the application 146 enables interaction with the caller by voice or speech when initialized 152. Depending upon the user response input 144, the web server 138 may be configured to create 154 dynamic grammar applications. The web server 138 may then request grammar items 156 from an application database 158 of the application-server database 140.

[0028] The grammar applications may include an extranet grammar and an intranet grammar. An extranet grammar may be configured to allow a user to define a set of voice commands that, when spoken on the resource channel 114, enable the user to achieve a desired result to interact with an application. An intranet grammar may be configured to allow a user to define a password-protected set of words that, when spoken on the resource channel 114, enable the user to initiate any number of applications. Examples of such application follow in more detail below.

[0029] As mentioned above, the application server 132 may be configured to run one of a plurality of applications based on input from the caller. For example, the caller may make a number of voice commands which the speech server 136 is configured to recognize. For example, the voice commands may include commands for causing the application server 132 to call one of the communication devices 102 (i.e., a contact associated with one of the devices), to send an object (e.g., a document, a photograph, an email, a facsimile, an invitation) either to one

of the communication devices **102**, or to perform another function. In addition, the plurality of applications may include sending a mail-merged document, fax, or email; pushing a URL, document, or file into an invitation web session; and playing a recorded program to interact with any number of users when the caller disconnects.

[0030] An example of methodology for implementing one of the voice commands, a **CALL** command, is illustrated in FIG. 7. In a number of embodiments, the caller may say “call” (or some other predetermined command) which is recognized by the speech server **136** (see FIG. 6), thereby causing a **CALL** application to be initialized. The speech server **136** may output **142** an audible prompt **160** to the caller such as “who” on the resource channel **114**. The caller may then state **162** the name of a contact or a phone number to call. If the response from the caller is not recognized **164**, then the application server **132** may prompt **160** the caller again. If the caller response is recognized **164**, then the application server **132** may determine **166** whether or not there are multiple targets associated with the caller response. If there are, then the application server **132** may prompt **168** the caller with a list of the targets associated with the caller response. The caller may then state **170** the desired target, with the application server **132** utilizing another recognize **172** loop in response thereto.

[0031] Upon recognizing the desired target, the application server **132** may retrieve connection data associated with the desired target from the database **140** and then send **174** the connection data to the softswitch **106**. The connection data may include telephone numbers, extensions, IP addresses, and so on. The softswitch **106** may set **176** the resource-channel data and then tear down or disconnect the **178** the resource channel **114**. The softswitch **106** may then send **180** an active-channel request and the connection data to the gateway **112** which, in turn, may add or connect **182** the active channel **116** between the origination device **102a** and one of the destination devices **102b**.

[0032] An example of methodology for implementing another one of the voice commands, a **SEND** command, is illustrated in FIG. 8. In a number of embodiments, the caller may say “send” which is recognized by the speech server **136** (see FIG. 6), thereby causing a **SEND** application to be initialized. The speech server **136** may output **142** an audible prompt **184** to the caller such as “what” and “to whom” on the resource channel **114**. The caller may then state **186** the name of a

document and the name of a contact to whom the document is to be sent. If the caller response is recognized 188, the application server 132 may then prompt the user to confirm 190 whether or not the document and the contact are correct by, for example, audibly responding to the caller. Upon receiving an affirmative response from the caller, the application server 132 may then send 192 the requested document, along with the email address of the requested contact, to an email server for execution. In addition, the application server 132 may then cause the softswitch 106 to disconnect or tear down 194 the resource channel 114. If the caller indicates the either the document or the contact are incorrect (at 190), then the application server may prompt the caller to state the name of the document 196 and/or the name of the contact 198. If recognized 202 and/or 204, then the application server 132 may then prompt the call to confirm 190.

[0033] Yet another example of methodology for implementing another one of the voice commands, a FAX command, is illustrated in FIG. 9. The methodology for sending a fax is analogous to sending a document described above and will not be repeated herein. However, the caller may initiate the FAX application by saying “fax” rather than “send.” And rather than an email address, the application server 132 may prompt the call for a contact or a fax number 206. In addition, when an affirmative confirmation 208 is received, the application server 132 sends the requested document and associated fax number to a fax server 210.

[0034] Still another example of application methodology is illustrated in FIG. 9 in which the application server 132 is configured to implement an INVITE application. Upon initializing the application by saying “invite” or similar command, the application server 132 may prompt 212 the caller for a name of a contact in the database 140. The caller may then state 212 the name of the contact to invite. If recognized by the application server 132, the caller may then be prompted to confirm 218 whether or not the contact is correct. If so, then the application server 132 may send an invitation template and the email address associated with the contact to an email server. In addition, the application server 132 may transfer to a web conference application 222 while maintaining the resource channel 114 so that the caller may conference with one or more contacts.

[0035] With reference to FIG. 11, according to other embodiments the telephone system 100 may include a plurality of softswitches 106 and a plurality of gateways 112. For example,

softswitch **106a** and gateway **112a** may be located remotely from softswitch **106b** and gateway **112b**, the latter of which may be associated with and located at the resource center **102**.

Accordingly, the resource channel **114** may be connected between the gateways **112**, with the local gateway **112b** in communication with the speech server **136**. In addition, the softswitches **106** may communication with each other on a softswitch channel **224**, with the local softswitch **106b** in communication with the application server **132**. The softswitch channel **224** may be an out-of-band signaling channel for transmitting connection data between the softswitches **106** or to the gateways **112**.

[0036] For the purposes of this description, the gateway **112** may include a device for facilitating connectivity between communication devices. The gateway **112** may also perform conversion between circuit-switched data and packet-switched data. For example, the gateway **112** may include an External HW from EXCEL, SYSCO, or Hosted by Global Crossing.

[0037] Those skilled in the art will understand that the preceding embodiments of the present invention provide the foundation for numerous alternatives and modifications thereto. These other modifications are also within the scope of the present invention. Accordingly, the present invention is not limited to that precisely as shown and described in the present invention.